



TEST REPORT: IRM-03-5

3W Single Output Encapsulated Type

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

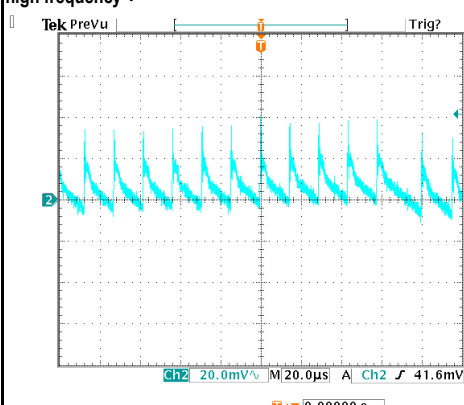
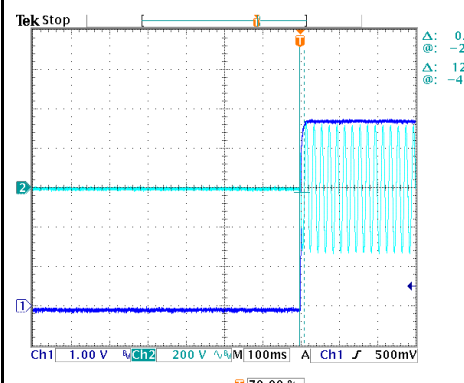
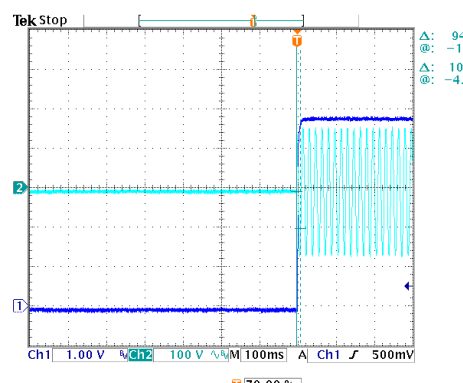
Safety Test

E.M.C. Test

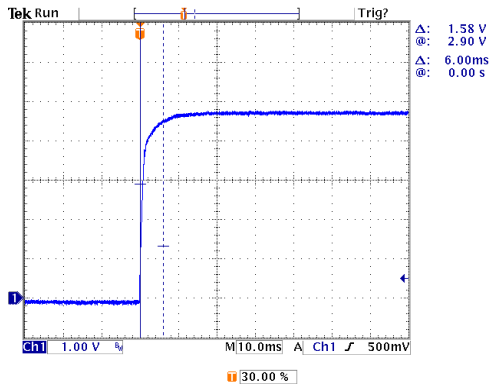
■ RELIABILITY TEST

ENVIRONMENT TEST

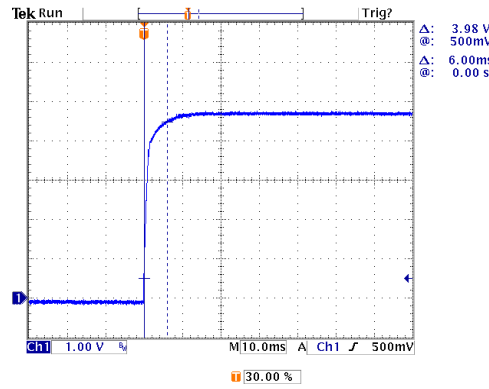
DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE RANGE	CH1: 4.900V ~ 5.100V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 5.01V ~ 5.01V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 2.0% ~ -2.0%	I/P : 100VAC / 305VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.20% ~ 0.00%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 305VAC O/P: FULL LOAD TA : 25°C	V1: 0.20% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.00% ~ -0.20%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 2.49 %
6	RIPPLE & NOISE(Max)	V1 : 100 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 70.4 mVp-p
		high frequency : 		
7	SET UP TIME (MAX.)	230VAC : 600ms 115VAC : 600ms	I/P : 230VAC I/P : 115VAC	230VAC : 12ms 115VAC : 10ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		
8	RISE TIME (MAX.)	230VAC : 30ms 115VAC : 30ms	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	230VAC : 6.0ms 115VAC : 6.0ms
		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



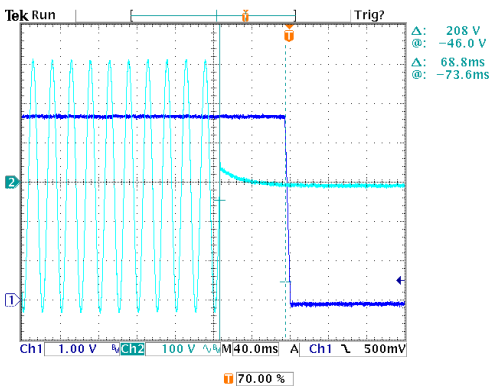
INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage



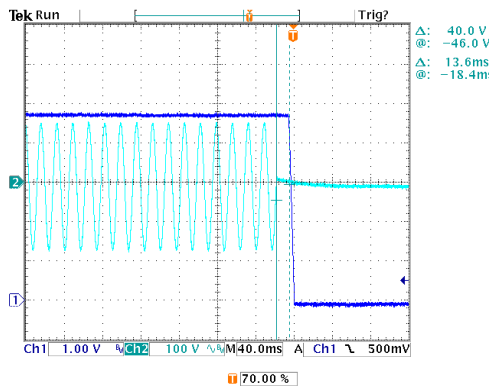
HOLD UP TIME (TYP.)

230VAC	: 40ms	I/P : 230VAC	230VAC	: 68.8ms
115VAC	: 8ms	I/P : 115VAC	115VAC	: 13.6ms
		O/P: FULL LOAD		
		TA : 25°C		

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

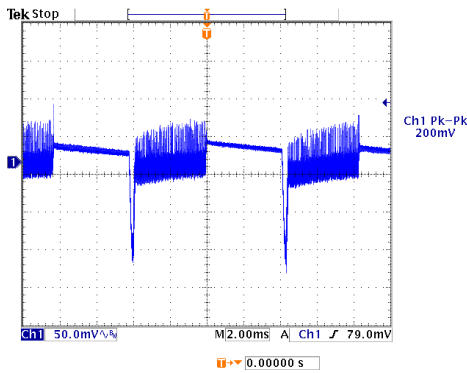
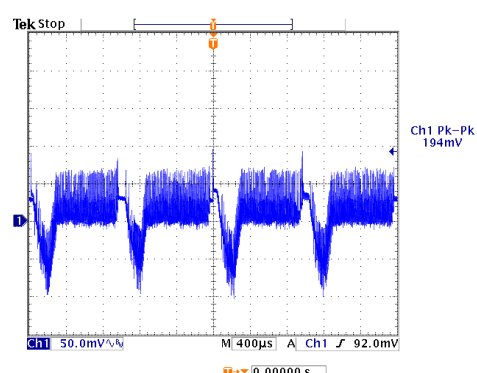


DYNAMIC LOAD

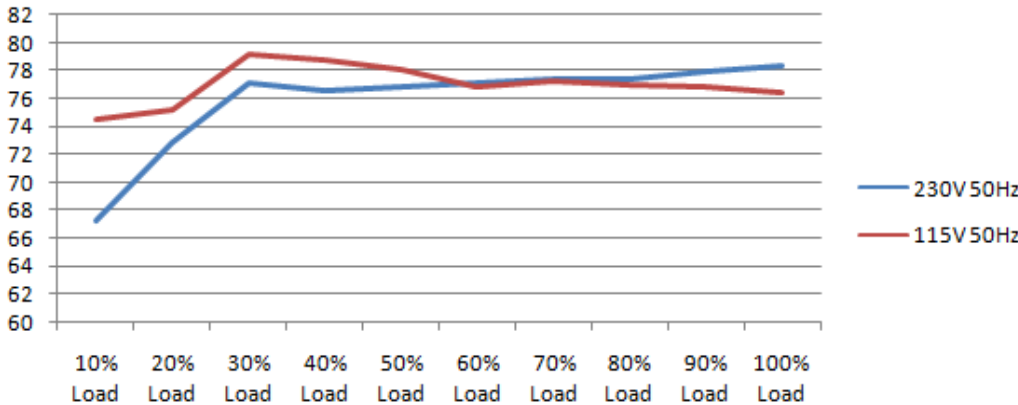
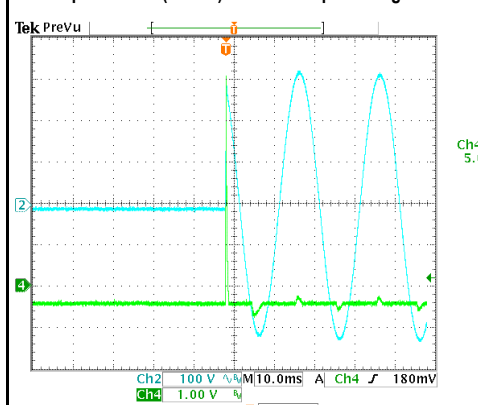
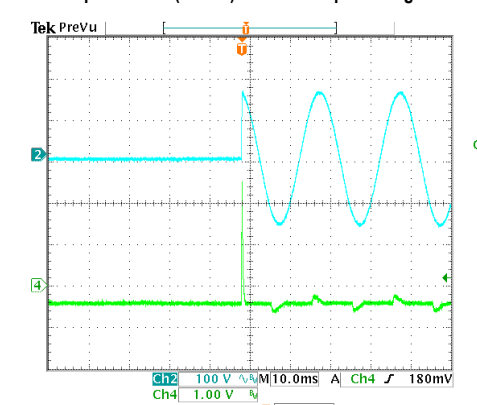
V1 : 1000 mVp-p	I/P : 230VAC	(1).	(2).	unit:mVp-p
	O/P:			
	(1)Full/Min load 50%duty/120HZ	V1: 200.0mv	194.0mv	
	(2)Full/Min load 50%duty/1KHZ			
	TA : 25°C			

FULL /50% LOAD 50%DUTY / 120HZ

FULL /50% LOAD 50%DUTY / 1KHZ



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC ~ 305VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	56.0VAC ~ 305VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 315VAC O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 305VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK
3	INPUT CURRENT (TYP.)	0.04 / 230VAC 0.07 / 115VAC	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 0.03092A / 230VAC I= 0.04967A / 115VAC
4	LEAKAGE CURRENT	< 0.25mA	I/P : 277VAC O/P : MIN LOAD TA : 25°C	L-FG: 0.0694 mA N-FG: 0.0691 mA
5	NO LOAD POWER CONSUMPTION	< 0.075W	I/P : 230VAC O/P : MIN LOAD TA : 25°C	< 0.039 W
6	EFFICIENCY (TYP.)	72.0%	I/P : 230VAC O/P : FULL LOAD TA : 25°C	78.2 %
				
7	INRUSH CURRENT (TYP.)	20A / 230VAC 10A / 115VAC twidth= 0 us measured at 50% Ipeak COLD START	I/P : 230VAC I/P : 115VAC O/P : FULL LOAD TA : 25°C	I= 5.06A / 230VAC I= 2.50A / 115VAC
		<div> <div> INPUT=230VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage </div> <div>  </div> </div> <div> <div> INPUT=115VAC/50HZ @ FULL LOAD CH2 : Input current (1V=1A) CH4 : AC Input Voltage </div> <div>  </div> </div>		

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105% ~ 260%	I/P: 305VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	221% 305VAC 210% 230VAC 200% 100VAC Hiccup Mode
2	OVER VOLTAGE PROTECTION	5.20V ~ 6.80V	I/P: 305VAC I/P: 230VAC I/P: 85VAC O/P: MIN LOAD Ta: 25°C	6.40V 305VAC 6.40V 230VAC 6.40V 85VAC Shut off o/p voltage, clamping by zener diode
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 85VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Hiccup Mode

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q1 Rated : 725V 0.4A	I/P : 315VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	VIN: 315VAC VDS: (1). 654.00V (2). 578.00V (3). 648.00V
2	Input Capacitor	C5 Rated : 2uf 450V	I/P : 315VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 434.00V (2). 438.00V (3). 436.00V
3	Control IC	U1 Rated : 6.85V (max) 6.0V (min)	I/P : 315VAC O/P : (1)Full Load (2)Output Short (3)O.L.P (4)Low Line No Load Vo(min) Ta : 25°C	(1). 6.60V (2). 6.12V (3). 6.12V (4). 6.60V
4	O/P Diode	D100 Rated : 45V 5.0A	I/P : 315VAC O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1). 26.90V (2). 27.10V (3). 26.90V
5	Clamp Diode	D1 Rated : 1000V 1.0A	I/P : 315VAC O/P : (1)Full load continue Ta : 25°C	(1). 624.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min	I/P-O/P: 3.300KVAC /min Ta : 25°C	I/P-O/P: 0.48mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P: 500VDC Ta : 25°C/70%RH	I/P-O/P: 9999MΩ NO DAMAGE

E.M.C. TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR: 8KV / Contact: 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT: 2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N: 1KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : IRM-03-3.3		
		1. ROOM AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 21.9℃		
		2. HIGH AMBIENT BURN-IN : 1.0hrs		
		IP: 230VAC O/P: 100% LOAD TA= 68.2℃		
		NO. Position	ROOM AMBIENT 21.9℃	HIGH AMBIENT Ta: 68.2℃
		1 C6	43.6℃	89.3℃
		2 R5	41.7℃	87.6℃
		3 R2	41.5℃	87.4℃
		4 T1	48.7℃	94.4℃
		5 C101	47.5℃	92.4℃
		6 D100	52.8℃	97.1℃
		7 U1	46.7℃	93.1℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE	I/P : 230VAC	TEST : OK
		1 HOUR (MIN)	O/P : 134% LOAD Ta : 25℃	
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 305VAC / 100VAC O/P : FULL LOAD Ta : -30.0℃	TEST : OK
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 70℃ NO DAMAGE	I/P : 315VAC O/P : FULL LOAD Ta : 70℃ HUMIDITY= 95.0% RH	TEST : OK
5	TEMPERATURE COEFFICIENT	±0.03% /(0℃~50℃)	I/P : 230VAC O/P : FULL LOAD	±0.0000% /(0℃~50℃)
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40℃ ~ +100℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH		TEST : OK



		4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC	
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ +75°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC Full Load AC ON/OFF test turn on 58sec ; turn off 2sec	TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 5G (5) Test Time : 60 min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	:SUPPOSE C101 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 70.0°C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 70.0°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 70.0°C LIFE TIME	(1). 158118 HRS (2). 17782.8 HRS (3). 35390.4 HRS (4). 62984.4 HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 2137.6 KHR	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 70°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ